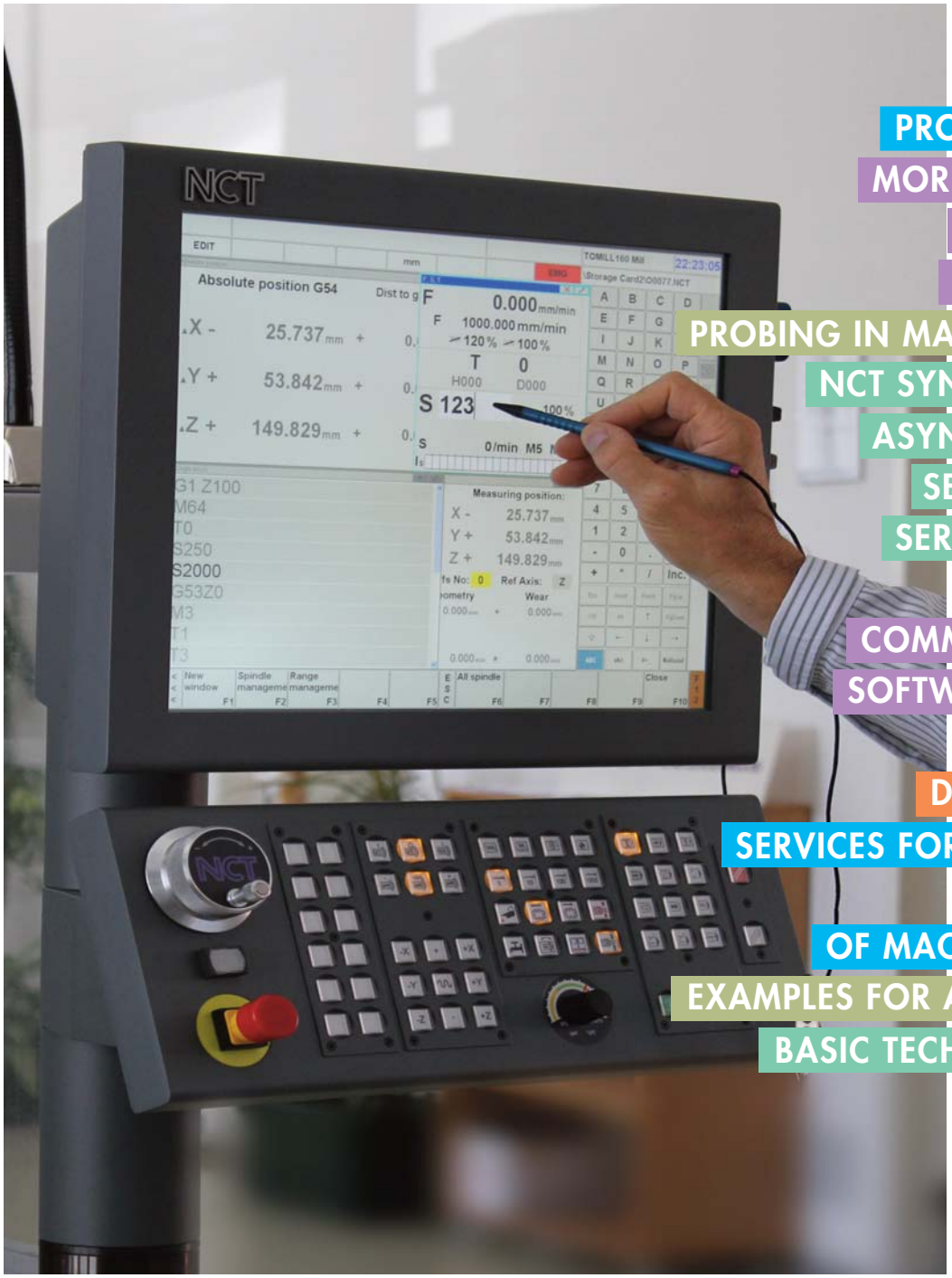
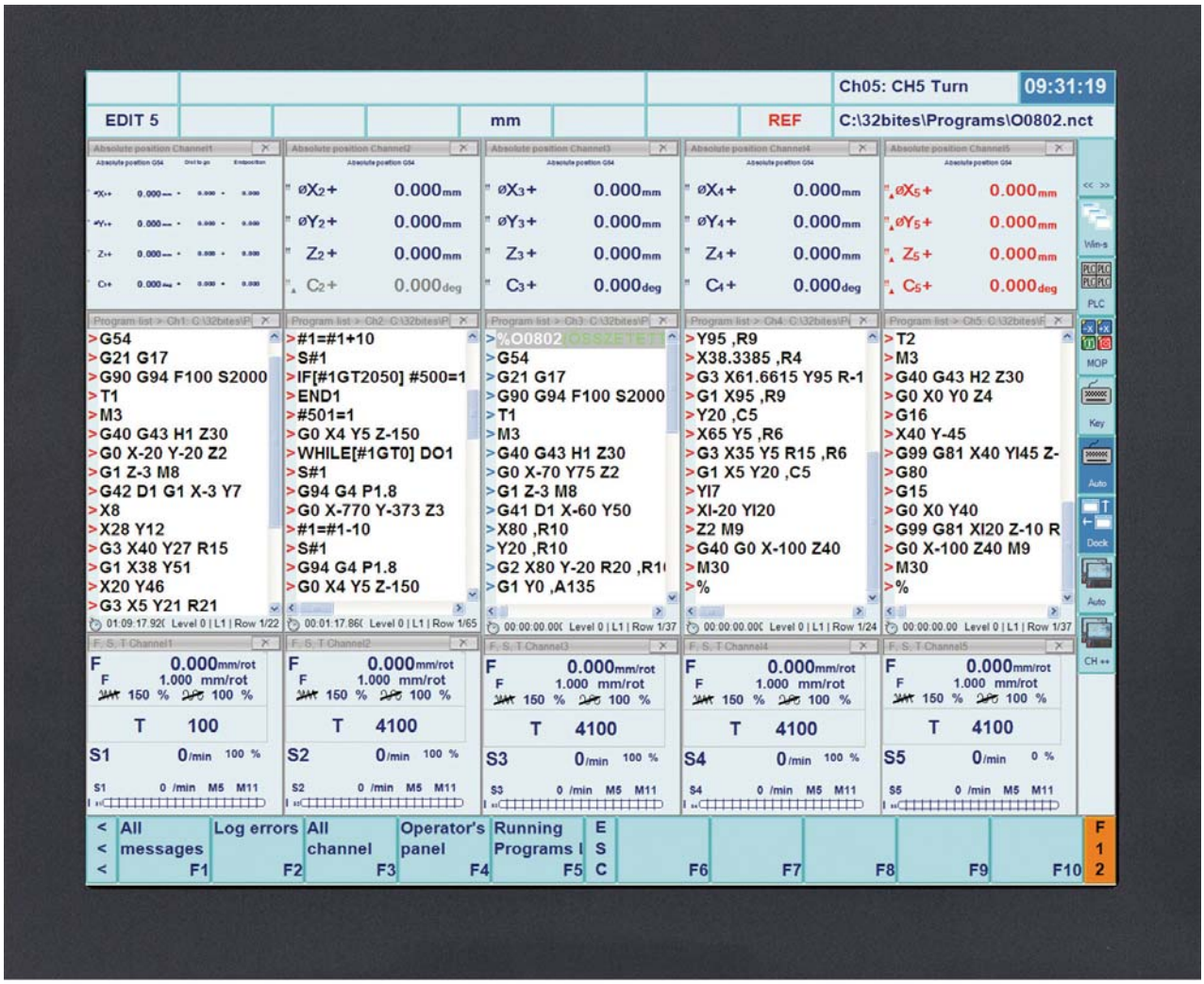
NEW
NCT 200

NCT®
CONTROL DRIVES MOTORS
KEEP MOVING

NCT 200 TOUCH - SMART CNC FAMILY
CONTROL DRIVES MOTORS



BASICS
HANDLING
PROGRAMMING
MORE CHANNELS
HIGH SPEED
MACHINING
PROBING IN MACHINE TOOL
NCT SYNCHRONOUS
ASYNCHRONOUS
SERVO DRIVES
SERVO MOTORS
PLC
COMMUNICATION
SOFTWARE UPDATE
SAFETY
DIAGNOSTICS
SERVICES FOR INCREASED
ACCURACY
OF MACHINE TOOLS
EXAMPLES FOR APPLICATION
BASIC TECHNICAL DATA

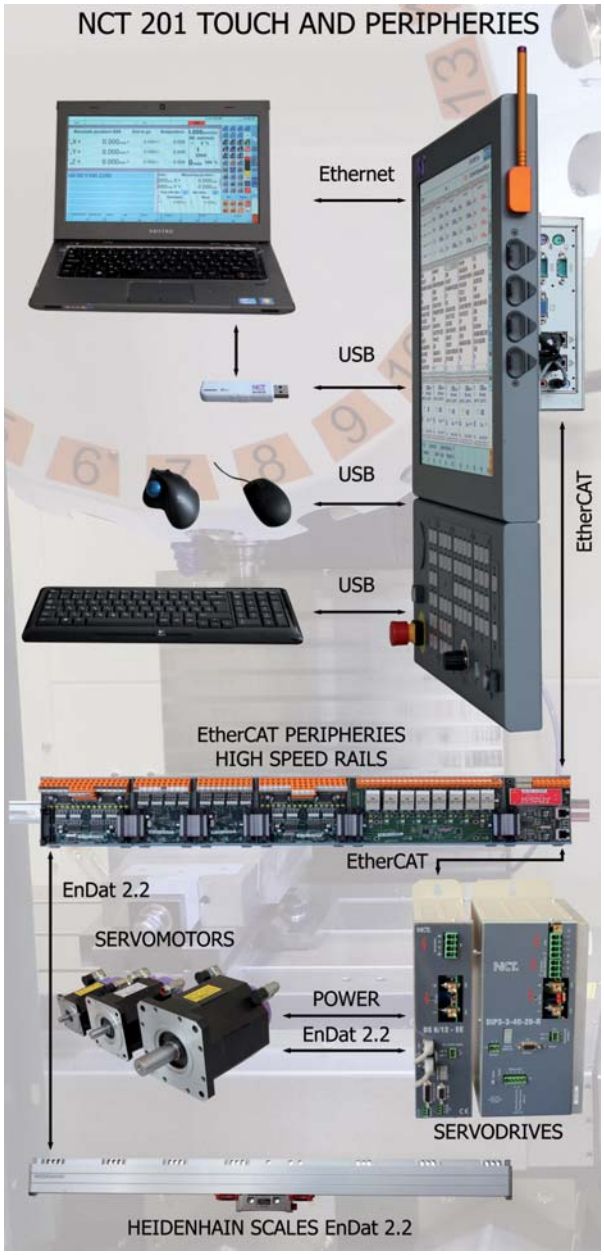


NCT 200 Control series

The evolution of electronics, faster microprocessors, internet, high-speed networks, mobile world, the endless range of PC peripheries and services turned the conservative industrial electronics upside down. These days a successful CNC is unthinkable without ETHERNET connection, high capacity memory, or a PENDRIVE for saving part programs or without any cursor device (mouse, touchpad, trackball, touchscreen).
The CNC system software has to adapt to the usual management techniques of PC (select, copy, search, file management etc.) and file compatibility is very important for the portability of programs. Windows Embedded, the operation system developed for industrial automation has been installed in the NCT 200 controls to fulfill these requirements. The connection between the peripheries and the central unit managed by standard industrial ETHERNET (EtherCAT) channel, which is a worldwide standard these days.
And something else! The default screen of NCT 200 control series is a touchscreen that is widely used in industrial computers (IPC) and mobile devices.

NCT 201 hardware

The NCT 201 is the first member of NCT 200 series control family. The industrial CNC CPU of the NCT 201 is located behind a large LCD monitor and provide a single unit for easy installation. This hardware includes the complete CNC software together with integrated PLC. All peripheries that control the machine tool connect to CNC by EtherCAT channel that is a worldwide standard these days. Installer of NCT 201 is free to select the compatible elements from different manufacturers and connect them to NCT control due to the standardized periphery management and the worldwide standard.
These EtherCAT peripheries are the operator keyboard, handwheel, wide range of PLC in/output devices and servo drives.
The use of an operator keyboard designed by the integrator, or retaining the original operating panel of the machine in case of a control retrofit is easy and inexpensive. The peripheries of NCT and those of other manufacturers can easily be mixed and matched.



Touchscreen

Reliable, easy cleaning and operator-friendly
Reliable
Touchscreen is a preferred user interface for industrial computers (IPC) that work in very rough conditions, and became the standard screen option for mobile devices (phones, tablet PCs) in the last few years. Due to high demand the TOUCHPANEL manufacturers developed their products to such a high quality that their lifecycle is longer than that of the high quality industrial pushbuttons.
We only use the touchscreen of the leading manufacturer of the world and the lifecycle of that is more than 10 million clicks.

Touchscreen

Easy cleaning
Frequently asked questions are whether the touchscreen will be damaged by wet, oil-covered hands and how can the polluted screen be cleaned.
The touchscreen is protected by a special non-reflecting adhesive foil that resists mechanical effects, and can be cleaned by one movement with a soft cloth unlike the raised surface of conventional keyboards. The inexpensive adhesive foil can be replaced easily and quickly even by the user in case of a damage.

Windows Embedded CE 6.0

EtherCAT®

EnDat 2.2

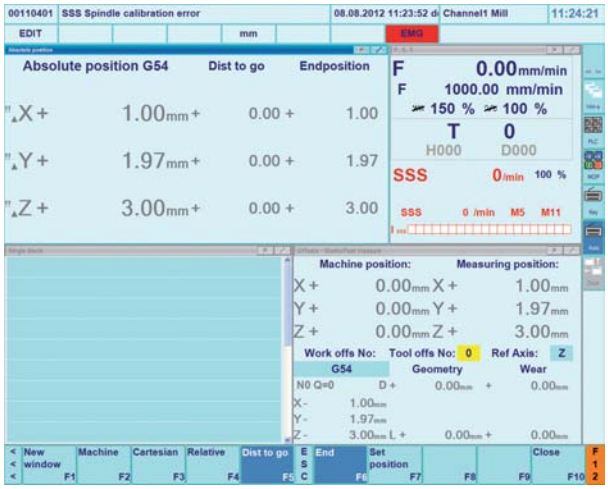
NCT®
CONTROL DRIVES MOTORS
KEEP MOVING

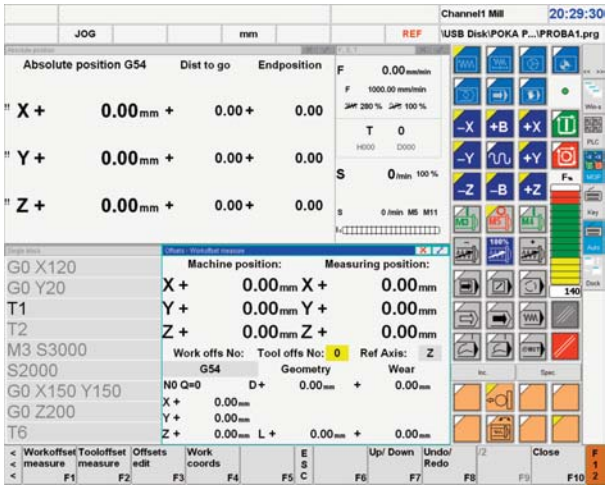
Touchscreen

User-friendly

The user-friendly interface (HMI) is the most important advantage of a touchscreen.
Data input is done by a virtual keyboard "painted" on the touchscreen. The keyboard picture only appears and takes up screen space when data input is possible. Adapting other languages is not a problem due to the virtual keyboard; user can select the language of keyboard easily. The size and location of buttons provides convenient data input. When pushing buttons a clicking sound can be heard.
The user friendliness of a control interface depends on how many buttons need to be pressed to achieve a certain function. Of course, the target is the minimum button clicking. Touchscreen also helps here. There are several windows in the screen of NCT control at the same time. The button zone in the lower section shows the control options of active window. Pressing its surface can activate any window.

Should the user prefer a PC keyboard, there are 4 USB terminals, and any type of PC keyboard can be connected to one of them. The wired or wireless PC keyboard can be placed on a tray under the machine operator panel in a convenient, ergonomic position. The keyboard tray can be ordered as an option.





Sound signals

There is a connection for speakers in NCT 200 control family emitting clicking sound by pressing the keyboard screen, or if there are alarm signals. A voice adviser option will also be offered in the near future.

Nanointerpolation

The internal data management of NCT 200 control series enables the nano resolution path generation. Speed computing, and all path and speed compensations are in nano resolution. The EnDat 2.2 measuring system and EtherCAT communication channel assure the resolution and speed required by nanointerpolation. It provides enhanced accuracy and surface finish during machining.

Mr. Antal Szabó, chief engineer of electricity and PLC design

Mr. Zsolt Vadász, electrical engineer, installing NCT 201 in a machining centre

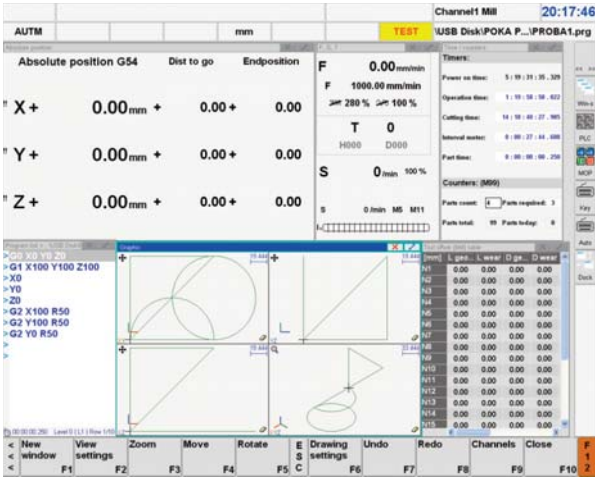
Programming on myNCT

Mr. Róbert Goron, electrical engineer, installing NCT 201 in a BUFFALO horizontal lathe

Windows in screen

Create your own user interface that offers the most convenient operation!

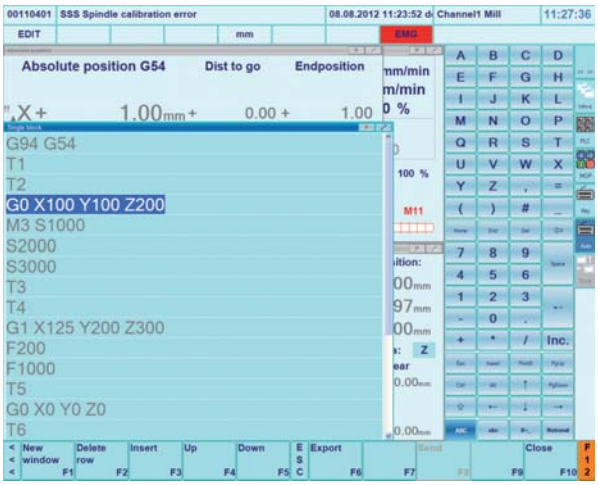
The reason for application of window structure is user interface created in WINDOWS operation system. Each window is an individual panel whether or not contains data input or other control options. User can locate panels anywhere in the screen in arbitrary disposition. Panels can be resized optionally. The screen composed by user can be saved or also frozen. The frozen screen can not be modified (resize or close panels).



Windows in screen

Manual data input

The features of manual mode are important to manage the user-friendly supply of CNC machine tools. The NCT 200 controls also excel in this subject. The control saves the issued commands and lists them on the screen. By highlighting any command line on the list, the commands can be issued again.



Compatibility

Lathe, mill, grinder, sheet metal cutter CNC

It is a great advantage if different type of machine tools can use the same control and the operating and programming system is compatible among them, and there are only technological differences. The NCT 200 series controls can be installed in different machine tools, and only specific PLC programs and necessary technological macros need to be developed.

Efficiency, Compatibility

ISO programming = Efficiency, Compatibility

The programming and executing of programs in the NCT 200 controls is fully compatible with previous NCT 100 control series and with several Japanese and American CNC controls. This is the easiest solution to connect CAM systems to NCT 200 series. This is an efficient, fast programming language, the worldwide alphabet of CNC techniques.

MACRO

MACRO programming by defining symbolic variables

The popular MACRO programming used in NCT 100 controls is also available in NCT 200 controls. The advantage of the new Macro system is that the variables of the macro program can also be referred to by symbols.

myNCT

myNCT

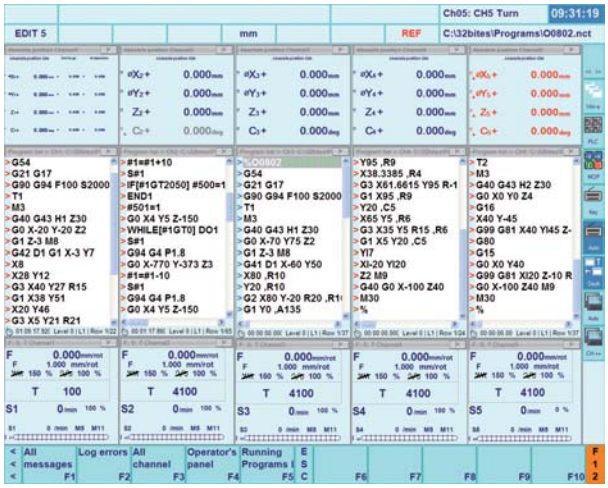
However, the most efficient CNC program is still written in G-codes, the program writing time, not the program executing time has to be reduced at single piece or short-run production cases. The myNCT program editor helps in this activity. The machining can be done and simulated graphically by drawing the contour of workpiece and filling some dialogue charts in a few minutes. Of course you can do it while executing another part program.

Mr. Pál Maklári, quality controller of NCT, making the final inspection

Visitors of the Industria exhibition in Budapest

More channels

One of the most important advantages of the NCT 200 controls is the multi-channel structure. It means several logical CNC controls in one physical unit. Each channel is an individual CNC control that executes its own technological program by continuous coordination with the other channels. The number of channels limited by only the speed of CPU, that can be at most 8 in the present system. The control has all the features and functions which are necessary for multi-channel CNC machine tools, such as special tool management or simultaneous, transposed or superposed axes.



NCT 201 in five-channel operation

HSHP

High-speed high precision machining path

You move much slower on a curvy unknown road than on one, where someone always determines the speed to take the next curve safely. The tool path generator of the CNC reads ahead up to 1000 blocks before execution to ensure maximum machining speed and computes the feed speed of the next contour element by making sure not to exceed the safe acceleration and deceleration parameters of the machine tool.

Point filter

The CAM programs often generate unnecessarily short movements by machining the respective contour. By switching on the point filter option the machining speed will significantly increase without decreasing the accuracy. In this case the point filtering combines programmed movements into a block as long as the amount of movements does not exceed the limit of any axis defined in parameter. The block generated by combined movements is a straight line between the starting point of first block and the endpoint of last block.

Two-channel Swiss-type lathe controlled by NCT 201

Acceleration deceleration

The execution of acceleration/deceleration influences significantly the speed of high-speed high precision contouring (HSHP). The NCT 200 controls change speed parabolic so it provides the fastest path speed by the smallest load of mechanics of machine tool.

High speed and high precision Topper MC from Tong Tai with NCT 201

BUFFALO LT-52 Slant-Bed Lathe with NCT 201

Measuring in machine tool

Tool or workpiece touch probe from any manufacturer can be connected to NCT 200 controls by ETP card. MES software integrated in control manages high variety of touching, measuring functions, the DIGI program package touches control path and complex surfaces. Some manufacturers (RENISHAW, M&H) offer software packages for their touch probes. These MACRO programs can also be installed in NCT controls.

Tool measurement

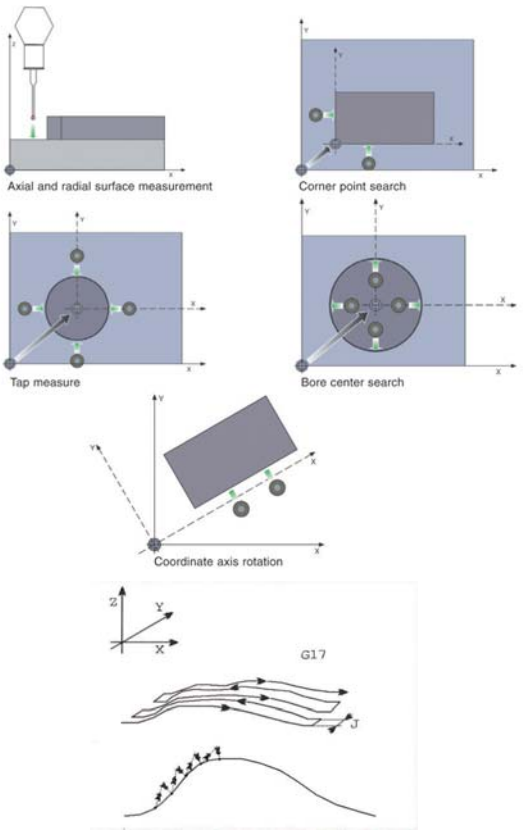
The tool is essential to ensure machining accuracy of the workpiece. The tool geometry can be measured quickly and safely by doing measurement in machine tool. Tool dimensional changes caused by tool wear can be managed by programmed measurement cycles during machining and tool wear or breakage of tool can also be inspected.
Tool measurement can be also performed on stationary or driven tools. Mechanic or laser device of several manufacturers (HEIDENHAIN, RENISHAW, M&H) can also be installed to NCT controls.

Workpiece measurement

Although workpiece touch probe is traditionally used for quick and accurate probing of workpiece zero point, the demand increases for measuring workpiece during machining. During machining the geometry of workpiece could change significantly and the necessary accuracy could not be ensured without measurement during interruption of machining, because of internal structural transformations.
Measurement cycles could be used for the most frequently used measuring tasks (shaft, bore, corner point, etc.). Coordinate transformation after measurement provides the accurate machining for incorrectly clamped workpiece.
Measuring and calibrating rotating axes of 5 axis machine tools have done quickly and easily by measurement in machine tool.

Digitizing

Digitizing inside of machine tool is actually a series of measurement. Software module integrated in control drives the workpiece touch probe along the workpiece contour in range defined by cycle parameters. In touching points the coordinates of touching sphere central point saved in technological program specified by operator. In this method a contour received is parallel to the original, that is generated by using CAD/CAM software.



Mr. Gergely Kasznár, mechanical designer, with a special purpose application of a Topper vertical lathe (for machining wheels for high speed rails)

Mr. Péter Balogh, electrical engineer, installing NCT 201 in a Tong Tai Honor Seiki vertical lathe

NCT SYNCHRONOUS AND ASYNCHRONOUS SERVO DRIVES AND SERVO MOTORS

NCT servo drives

The NCT servo drives are complete EtherCAT peripheries. They are connected to NCT 200 control central unit (EHU) by one EtherCAT bus. Moving commands are received and also absolute position transmitted to CNC software by using this wide-frequency channel. NCT servo drives are developed especially for machine tool applications. The NCT servo drives are the essential peripheries of the NCT controls due to their extremely fast and accurate current and speed regulation capabilities.

SoE

SERCOS over EtherCAT

The NCT control communicates with servo drives by a widely used standard protocol. Using servo drives of several manufacturers is possible because of standard connection. Setting servo drives is done from NCT control easily, without external device. The tested parameters are saved in control. The control loads the parameters into each servo drive every time when it is switched on, so the parameter setting is automatic also in case of changing motor or servo drive.

Parameter setting Servo drives

The NCT servo drives are connected to NCT control by using standard SoE (SERCOS over EtherCAT) or CoE (CAN OPEN over EtherCAT) protocol, so servo drive parameters can be loaded from control. Parameter sets of servomotors and servo drives saved in HDD of the control. In case of starting up a system consisting of control and servo drives or changing a servo drive the assigned parameters are loaded immediately and the servo drives will be ready for operation. There are ready, tested parameter sets for all NCT synchronous servomotors in HDD of NCT 200 controls for our users.

NCT motors

Developing NCT servomotors is one of the most successful, most effective developments of our R&D department. The NCT A, Ai, AiS, AMS and TORQUE motors also satisfy the highest demands. The mechanical construction, size, speed, and electric parameters of our motors are developed especially for machine tool applications. However, the Ai motors are mounted with EnDat 2.2 absolute rotary encoders as standard, each NCT servomotor is available with incremental TTL or sinusoidal output (SINCOS/1Vpp) measuring system as option.

Mr. József Deák, sales director of NCT, in negotiation with customers

Mrs. Krisztina Tóth, sales manager of NCT

Synchronous servo motors

NCT synchronous servo motors are available in 1 Nm -75 Nm torque range with three flange sizes. The shaft design and connecting main dimensions are compatible with similar sized motors of several Japanese manufacturers.

Asynchronous spindle motors

High-speed asynchronous motors are primarily used for driving spindles of machine tools, and are available with through-bored shaft and up to 15000-rpm speed. Air- or liquid cooling is also available depending on size and construction.

Torque motors

The TORQUE motors can rotate or tilt a rotary table or milling head directly, without inserting any drive mechanism. These motors can produce extremely high torques constantly because of high intensity liquid cooling.

BUILT-IN SPINDLES MOTORS

- Higher dynamics because of smaller inertial mass, lower loss, lower current drain
- Better workpiece geometry thanks to the lack of deformation caused by belt tension
- Higher lifetime, better surface geometry on workpiece and higher tool insert life thanks to much lower vibration level
- Better workpiece geometrical and repeating accuracy, longer lifetime of bearing thanks to lower thermal deformation because of high intensity liquid cooling
- Long bearing lifetime
- Low noise level

These are the advantages of lathe built-in spindles compared to conventional belt drive. The liquid-cooled lathe built-in motor spindles are available in two center line sizes and several spindle dimensions.

Mr. István Kiss , sales manager of NCT, meeting clients

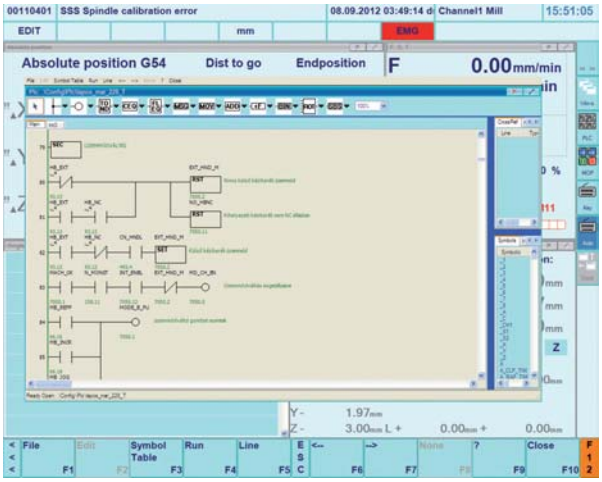
Mr. István Póka, (CEO) introducing the new NCT 201 to a customer

Mr. Árpád Nyitrai, sales engineer of NCT, meeting clients

Mr. Szilárd Kerekes, director of NCT Sales Office in Romania

PLC

The PLC integrated in the NCT 200 controls can be programmed in popular LADDER system, providing effective error detection for maintenance and repairing personnel. Ladder displayed in the PLC window and the "green flow" represents logical states and processes during operation. High-level language (PYTHON) is available for PLC programmers, machine tool builders to create their own user interface.



EPU

Locomotive of EtherCAT IO periphery train

Coupler unit (EPU) with EtherCAT connection create an IO periphery with periphery elements connected by LVDS bus. These units can be placed at any point in the machine. The full length of EtherCAT network can be up to several kilometers. The maximum distance between two network elements can even reach 100 meters. A lot of wiring could be saved in IO peripheries located optimally inside the machine.

IO peripheries

Wide range of IO peripheries

The peripheries of NCT controls are connected to the CNC control central unit (EHU) by EtherCAT channel. They can be NCT IO units, NCT servo drives, and also standard EtherCAT peripheries from other manufacturers (BECKHOFF, YASKAVA, ABB, HITACHI, BAUMÜLLER, LENZE, SEW, WAGO etc.). The IO periphery system developed to connect "carriages" with different tasks, in different length to EPU ("Locomotive") with EtherCAT connection by ribbon cable, using LVDS bus. This "train" "runs" on DIN rails which are widely used in building electric panels and cabinets. There are 20 "carriages" (periphery modules) available for different tasks currently, but the selection is constantly extended and arbitrary "carriages" can be constructed for different user demands.

Phyton

Programming using high-level language

Graphical user interface customized to a task make it easier and more convenient to operate a barfeeder connected to lathe or a palette changer of a machining centre. High-level language (PYTHON) is available for PLC programmers, machine tool builders to solve these tasks.

Mr. Zoltán Gábor, director of MICROMATIC Ltd., partner company of NCT

Mr. Attila Csapó, director of FÉMO Ltd, NCT's partner company

ETHERNET

ETHERNET connection is a basic accessory of each part of NCT 200 control series. It can be connected into any WINDOWS network (TCP/IP protocol, 100 Mbit/sec speed) without any external software. After that a part program can be loaded easily into the HDD of the control, or it can be assigned to run and execute without loading it into the memory of control.

USB

There are 4 pcs of USB ports on the NCT control to receive USB peripheries as usual in world of PC. PENDRIVE, keyboard, various cursor units (mouse, TRACKBALL, TOUCHPAD etc.) can be connected here.

Software update I.

Update NCT system software

The system software of a NCT control will be constantly developed, expanded in the following years. New versions with improved knowledge; functions will be expected to be introduced every 2-4 months. An important feature of the NCT 200 control series is that users can install the new software version easily, and it does not require the assistance of NCT..

Software update II.

Change system software of servo drives

NCT is constantly developing its products and install new features continually. These changes could improve an existing knowledge or install a completely new one. System software of CNC or even servo drive can be reinstalled by machine builder or user conveniently without requiring the assistance of NCT. The features of new software versions are in the NCT website and the software can be downloaded from here.

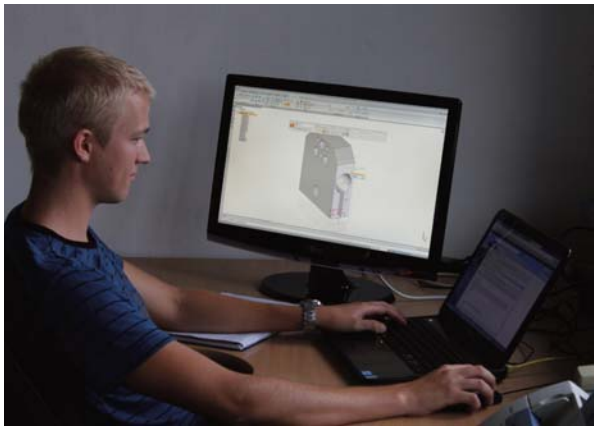
ESIC card

(EtherCAT Software Integrity Card)

This unit is a multi-function part of the NCT control hardware. The operational job is to manage EtherCAT junction, write dynamic non-volatile memory and manage software protection key and PAYBIT. The software protection saves the list of options purchased by the user and it enables or disables using of them based on the list. In case of replacing the control, all purchased functions will be transferred to the new control by inserting the card into the new control.

Paybit

PAYBIT function is available for NCT controls. This is an option for selling party to switch off the control in case of payment contention. The PAYBIT is a remote function. The operating time is determined by the machine builder and is saved in the memory of ESIC card of control. Any working time can be set in hour resolution. After the setting time expired the control decreases the upper limit of speed range shift (OVERRIDE) and decreases rapid traverse and feeding speed for 8 hours by 20%. Decreasing speed is a warning for user that the machine will stops in a few work tours. Manufacturer could switch off or set delay for PAYBIT by phone or remote computer function. PAYBIT function is an option for us if necessary.
Customer has to be informed about the PAYBIT function!



Offline programming, program transfer on ETHERNET channel

NCT control in operation

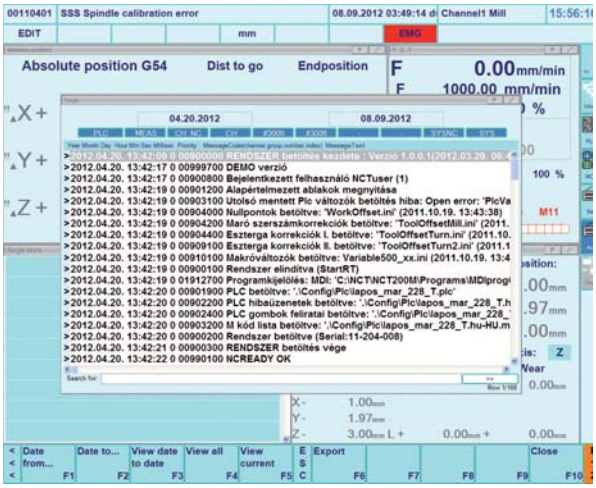
Mr. Robert Pilcz, director of SLOVTOS Ltd.(Slovak R.), NCT's partner company

Customers at the INDUSTRIA exhibition in Budapest

Logbook

Creating Logs, sending log file

The inspection module of NCT inspects and records every event and creates an event history!
The NCT 200 controls save each important event in a log file. In case of any malfunction during the operation of the unit, whether or not it was caused by error of servo system, operator error, or error detected by PLC. This log file can be sent to the NCT customer service center by email. Control will be an open book for NCT professionals by log life. There is a tutorial video in Youtube to manage log files for users (create an NCT 201 error log file).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View all
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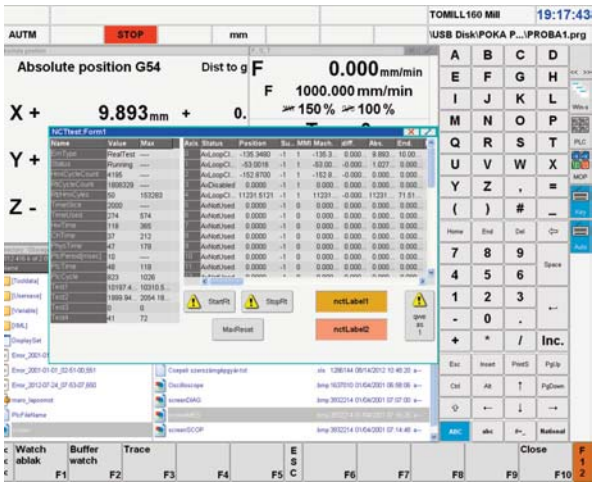
Close

Remote machine

Remote diagnostics can be performed by means of the "remote machine service". If the customer can provide a login facility to the NCT control the NCT technicians can connect to the user interface and manipulate the CNC control from a remote PC, no matter where the machine is located.

Auto parameter setting

The NCT asynchronous servo drives are often connected to motors without known, tested parameter set. The "auto parameter setting" function integrated in our asynchronous servo drives is used to install these motors. The user only has to enter into the CNC control the original parameters found on the motor data plate. The servo drive software analyses and computes an optimal parameter set to achieve the best motor control. Of course the computed parameters will be refined, saved and reloaded after adjustments.



Services to help setting servo axes

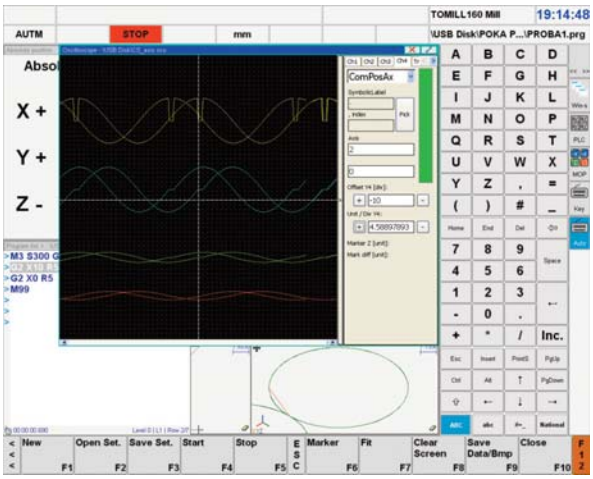
Diagnostic functions help error detection and tuning of servo axes. The characteristics of commands issued by the path generator, speed, position, tracking error (lag) of axes can be displayed in the oscilloscope screen integrated in to the control. By using circular test you can verify whether the settings and the operation of servo system are correct, without using external unit. Of course the features can be displayed in numeric format and in a chart.

NCT booth on the Industria exhibition in Budapest

Mr. László Horváth Director of R&D department consulting with customer at Industria exhibition

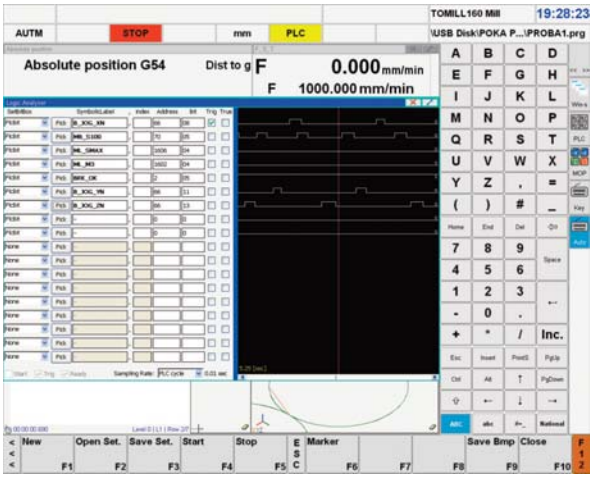
Oscilloscope

Oscilloscope with digital memory integrated in the control is essential for accurate setting of servo drives. The signals displayed graphically in relation to time can be set in 4 channels simultaneously. These can be signals of servo system, PLC IO lines or state of internal flag bits or value of variables. Saving starts when START button pressed is independent from fulfilling triggering conditions. Measurement continues until available memory for saving data is full if triggering conditions (channel, positive/negative transition) fulfilled. If data fills more than a half of memory before fulfilling triggering condition than saving continues until triggering point will be placed in the middle of memory.
These settings can be saved and loaded. The inspecting part can be searched, the selected interval could be increased, decreased, the size of signal could be increased, decreased, the signal could be offset vertically. The measuring results can be saved in .xls file format to transfer them to an external computer for additional analysis.



Logic analyzer

The PLC connection signals and their condition can be selected by name and can be displayed in 18 analyzer channels, and they can be studied in relation to time on the control screen. Any channel could be assigned as triggering source either by falling or rising edge. Elapsed time from triggering point or distance between any two moments can be measured. Measurement results can be saved in a selected file, or measurement can be started immediately by loading any saved configuration.



IO test

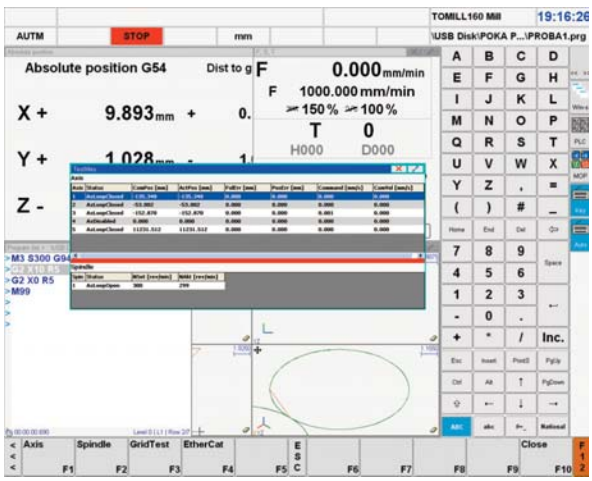
The IO lines which can be either "read/write", or "read only" by the PLC will be displayed in a clear table.. Some of these are physical input and output signals between machine tool and CNC, while others are the communication lines between PLC and CNC. Bit setting (SET/RESET) or overwriting memory range is possible..

Symbolic IO

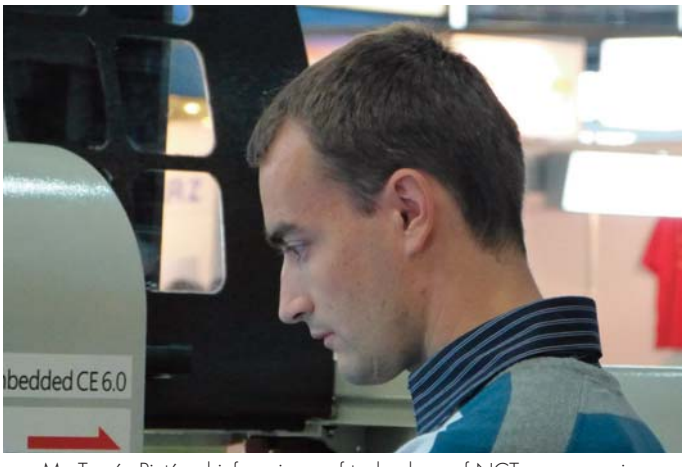
PLC variables can be displayed below each other in any convenient order. Name, address and contents of variables can be displayed in binary or decimal representation..

TestMes measuring system test

The servo settings will always be performed by inserting the expected parameter values in the displayed table. The required properties of the table can be selected by the softkeys below.. The servo axes are displayed in the rows of the table, while their properties are displayed in the columns of the table.



Mr. István Végh, giving technical advice to customer by phone



Mr. Tamás Pintér, chief engineer of technology of NCT, programming a two-channel Swiss- type lathe

Reversal error

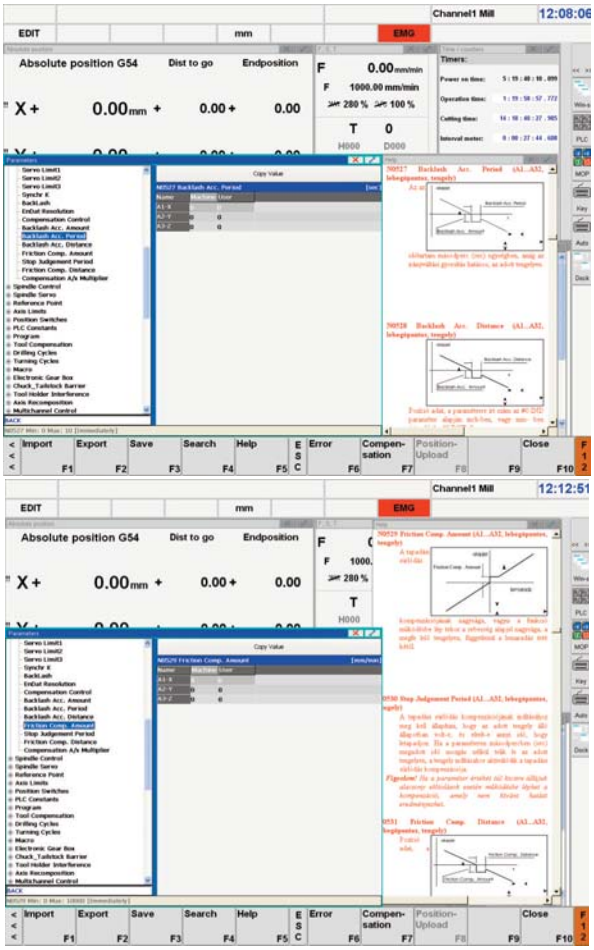
This is the basic compensation for each machine tool control. Most of the time the movment of a slide is generated by the rotation of a servomotor. When reversing direction, the motor rotates for a short interval as the slide does not move yet, because of the backlash and flexibility of mechanical parts that transform rotational motion into straight-line or rotational motion. This movement lag can be corrected by the value in the "Backlash" parameter that compensates also linear and rotating axes.

Linear accuracy

The most commonly used and most appropriate measuring device is the laser interferometer that measures the effective position of axes between movements by 0,1 micron resolution. The measuring results can be saved in the Pitch Error Compensation parameters of the CNC control and the measured position can be modified in each point based on these data. The reversal error compensation will be performed automatically if the laser measurement is done in both directions of an axis.

Reversal acceleration

This compensation reduces significantly the oscillation of servo axis and the dynamics of a machine tool equipped with linear scale can be increased, even in case of very "loose" mechanics. While machining with low feed or in circular interpolation the speed of the servomotor will be the highest when the slide starts to move due to backlash. Usually there will be a state of oscillation that is difficult to manage. The reversal acceleration will speed up the servo motor and after a preset time or distance the normal speed signal will be restored. This needs to be set the way, that when the slide starts to move the servo drive has already been programmed for the normal feed command.



NCT 201 on a Tong Tai Topper TNL-130AL machine

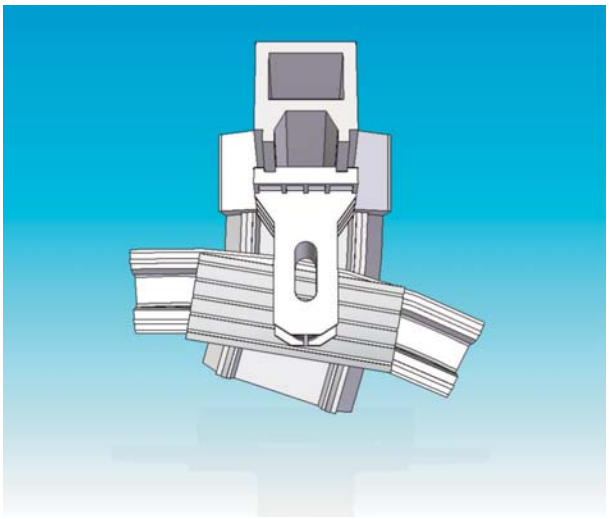
JINN FA-NCT gang-type lathe with supporter and barfeeder

VD-510S new tapping centre with NCT 201

New BUFFALO LT-52 slant-bed lathe with NCT 201

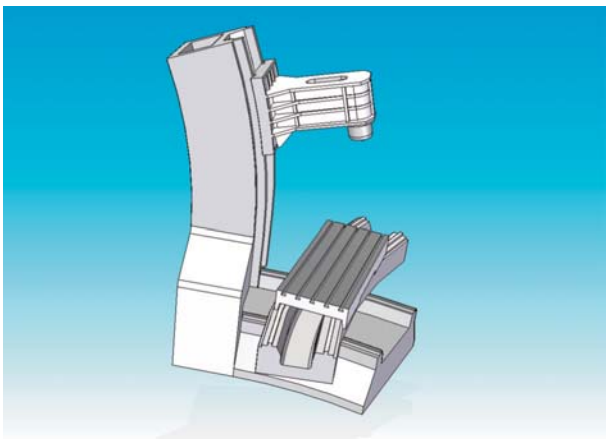
Stick slip

The phenomenon of stick slip can occur on wide flat box ways where the stick slip compensation can be used effectively. The slide movement can be initiated by a "kick start" through a parameter with preset time and speed impulse value, and by immediately returning the speed to the normal value as soon as the slide started to move. This eliminates excess speed caused by increasing speed command generated by position control loop for stick slip. The position control loop oscillated by excess speed significantly decreases the dynamics of the servo circuit.



Straightness

The straightness of moving slides is essential for machine tools as well as for the positioning accuracy. However, builders tend to develop the best geometry and straightness for their machine tools, improving machining or fitting accuracy above a certain value is not practical. Electronic compensation can be used efficiently in these cases. The straightness deviation of axes has to be measured before adjusting the relevant parameter. The control manages to move axes perpendicular to movement by setting the value after filling in measurement results.



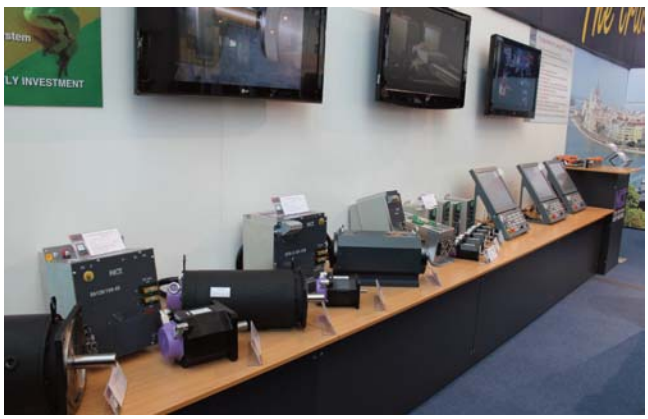
Thermal deformation compensation TDC

Compensation of thermal deformation based on temperature measurement

Direct position measurement by linear scale is a perfect solution that compensates thermal deformation of linear axes of a machine tool. Although deformation of elements that can not be or difficultly measured directly is a significant problem, for example at the headstock of C column type milling machines. The headstock is heated by spindle bearings, spindle motor, and cooled by coolant and the active cooling of spindle motor and spindle. Thermal deformation of headstock can be compensated by self-adjusting software model integrated in NCT control, based on signals of thermal measurement sensors in headstock.

NCT booth at the EMO exhibition in Hannover Germany

NCT 201 controls at the EMO exhibition



NCT asynchronous drives and motors exhibited at the EMO

NCT synchronous servomotors and built-in spindle motor exhibited at the EMO

NCT 201 on machine tools

Offering professional and also efficient CNC package for machine tool manufacturers and machine rebuild personnel has always been an important aspect in development of NCT CNC controls. NCT 200 series are the most developed products also in this aspect. It can be connected to almost all type of machine tools from a single spindle lathe to the most complex multi-channel multi-axis machining centers even in turning, milling, grinding, cutting or manipulation functions.
Although we assume the rebuilding and retrofitting of CNC machines with new electrical design, documentation, PLC programming and turnkey completion, we are mostly committed to find partners worldwide who can solve this really complex task by on their own, with our help.
Our machine tool builder or retrofitter partners receive ready PLCs and the machine parameters developed by us free of charge.
Well-skilled professionals of our technical online team can help solving problems installing, operating controls by phone, internet, email or also personally if it is needed.

Mr. Ferenc Deák, software developer, supplying a client in India via SKYPE

TOPPER TNL-130AL Tong Tai machine controlled by NCT 201

Big BUFFALO horizontal lathe with NCT 201

VD-510S tapping centre with NCT 201 control

JINN FA-NCT gang-type lathes on the assembly line

NCT Academy CNC education Ltd., for the skilled clients and partners in the field of technologic programming and operating and PLC programming

School room for practical education

GROUP	ITEM	S/O	DESCRIPTION
HARDWARE	1,8 GHz ATOM CPU	S	High speed by minimal heat production Control panel does not require external cooling
	16 GB memory	S	Running CAD/CAM files do not require external computer Semiconductor HDD Without moving parts, only a single Compact Flash
	4 pcs of USB	S	100% PC compatibility Any PC keyboard can be used Any PC screen can be used
	Ethernet	S	Connect to office computer network Standard TCP/IP protocol
	Graphic touchscreen	S	19" or 15" size Touchscreen – default screen Default programming keyboard in screen Lifetime of touchscreen is 10 million presses (anywhere) Long lifetime, interchangeable protecting foil
	Machine control panel	S	ALPS pushbuttons Lifetime is 10 million clicks IP 54 protection Each button have LED light Modes, conditions, moving (JOG), start/stop buttons, speed and spindle range shifting switches 1 pc key switch Place for built-in handwheel 20 buttons for general purpose in 19" model 8 buttons for general purpose in 15" model
	Feedrate override	S	Magnetic arrestment Without mechanical arresting unit – long lifetime Absolute position measurement by magnetic indexing 31 ranges
	Handwheel mounted in control panel	O	Magnetic arrestment Without mechanical arresting unit – long lifetime Rotation measurement by magnetic indexing
	External, portable handwheel	O	Separated handwheel possible per axes Modes, moving and starting buttons, feedrate override Magnetic arrestment Without mechanical arresting unit – long lifetime Rotation measurement by magnetic indexing
	EtherCAT communication with peripheries	S	IO peripheries and servo drives can be connected to one Ethernet network Easy, inexpensive wiring Compatibility – using products of another manufacturer
	EtherCAT peripheries	O	Wide rage of variety Manufacture specific solutions by respected user demands

NCT's shop floor of CNC machine production

Electronic production

GROUP	ITEM	S/O	DESCRIPTION
BASIC CNC	Windows Embedded operation system	S	Windows file management Using standard WINDOWS peripheries
	Open Windows professional platform	O	NCT 202 Any application can be run beside of NCT HMI (user interface) CAD/CAM application (VECTOR, EdgeCAM)
	Intelligent software protection	S	ESIC - electronic protection card (EtherCAT Software Integrity Card) Protecting options Dynamic memory management without data loss PAYBIT EtherCAT junction (external handwheel)
	Softwares downloaded from Internet	S	CNC system program Servo drive system program Servo parameters Ready, tested PLC programs for different machine tools Application shop (NCT 202)
	Work piece time calculation	S	Work piece time calculation (real time) Take into account tool change time and other secondary times Also works in test run Graphic display
	Cycle intervals	S	125 us speed control 1 ms path compute 1 ms record processing 1 ms position control 10 ms PLC base 1 ms PLC quick module
AXES	Axis max. number	O	Max. 8 channel Max. 32 axes Max. 16 axes per channels Max. 16 spindles Selectable main spindle for cutting, thread cutting, tapping per channels
	Standard axis number	S	Lathe: 2 axes + 1 spindle Milling machine: 3 axes + 1 spindle or 4 axes
	PLC axes	O	Moving axes from PLC program
	PLC axes number	O	Not limited, any axis can be defined as PLC axis
	Reference signal output	S	EtherCAT
	Reference signal output IO train	O	Analogue CAN BUS Pulse forward/backward Pulse + direction
	Generate TACHO signal	O	Issue proportional analogue tacho signal to measuring system signal frequency in motor shaft Issue command signal in one analogue line (reference signal - speed)
	Position feedback by servo drive	O	EtherCAT TTL 1 Vpp (voltage sinusoidal) 11 uApp (current sinusoidal)
	Position feedback by IO train	O	EnDat 2.2 (HEIDENHAIN linear scale) TTL (retrofit) 1 Vpp (voltage sinusoidal) 11 uApp (current sinusoidal)
	Taking reference point by NCT servo drive	S	Absolute EnDat 2.2
	Taking reference point by IO train	O	Absolute EnDat 2.2 C type (HEIDENHAIN linear scale, angle gauge) Reference pulse Switch
	Compensations	S	Backlash error Thread pitch error Backlash acceleration Stick slip Straightness

GROUP	ITEM	S/O	DESCRIPTION
SPINDLES	Spindle max. number	O	Max. 16 spindles Max. 16 spindles per channel
	Simultaneous running	O	Several spindles running simultaneously
	Electronic interlock between spindles	O	Electronic interlock between spindles Ratio set by parameter Gear cutting functions Polygon turning
	Rigid tapping	O	Different acceleration for drilling and retracting set by parameter
	Orienting	S	To zero pulse of encoder To switch
MORE CHANNELS	Number of channels	O	Max. 8
	Represent channels	O	User can create its own screen
	Relation between channels	O	Wait from technological program PLC
	Special axis management	O	Synchronous control Superimposed control Mixed control
INTERPOLATION	Linear	S	Positioning Feed
	Circular	S	Along several quadrants
	Variable radius circle	S	Spiral of Archimedes
	Complex	S	Circular along 2 axes + linear along max. 14 axes
	Special	S	Polar coordinate Cylinder
	Tapping	S	Uniform pitch Through several records Different pitch
	Finishing (SMOOTH)	S	Laying third degree Bezier spindle curve
FEED RAPID TRAVERSE	Feed	S	Per minute Per revolution
	Feedrate override	S	Operated from PLC
	Acceleration/deceleration	S	Linear Quadratic
	Feed control functions	S	Continuous cutting mode Exact stop mode Corner override mode Tapping mode
	Feed automatic decrease	S	Internal machining of circle in G41, G42 state in the ratio of programmed and corrected radius Machining of circle in function of circle radius and permitted acceleration/deceleration Machining corners, in function of speed deviation set by parameter

Head office building in Budapest Hungary

Buildings of the NCT's machine tool production

GROUP	ITEM	S/O	DESCRIPTION
HSHP High speed and high precision tracking	Nanointerpolation	S	Path computing, compensations in nanometer resolution Increased surface quality
	Acceleration/deceleration	S	Quadratic speed change Acceleration/deceleration without knocking
	Multibuffer mode	S	Read forward 1000 blocks Switch on Switch off
	Feed forward	S	Tracking by decreased lag
	Point eliminator	S	Smoothing path generated by external device
	SMOOTH	S	Smoothing interpolation Bezier spline
COORDINATE SYSTEMS AND TRANSFORMATIONS	Number of workpiece coordinate systems	S	6 + 99
	Transformations	S	Rotating Mirroring Scaling
	Select plane	S	X-Y X-Z Y-Z
PLC	PLC integrated in CNC	S	Quick, economic
	Max. number of IO lines	O	512 INPUT 512 OUTPUT
	IO modules	O	16, 32 line inputs 16 line semiconductor outputs 8 line relay output Analogue input/output units (+/-10V, 4-20 mA) Linear scale connection Touch probe connection Pulse issue forward/backward Pulse issue (A, AN, B, BN) Pulse issue pulse/direction
	Ladder programming	S	Well-known programming language appropriate for international requirements Easy error detection
	Ladder display	S	Real time display of PLC processes in CNC Green flow
	Testing PLC	S	Logic analyzer Current flow display
MACHINE INSPECTION	Remote diagnostics	S	Connect to remote computer
	Logbook	S	The inspection module of software inspects and saves everything Graphic display
	Temperature diagnostics	O	Increased accuracy by compensating head deformations Measuring temperature in 8 points
	Vibration diagnostics	O	Increased safety Machine inspection

Retrofitting a Mori Seiki lathe with NCT control (USA)

NCT partner in the USA

GROUP	ITEM	S/O	DESCRIPTION
SOFTWARES TO HELP TECHNOLOGICAL PROGRAMMING	myNCT	O	Easy, effective programming Most effective solution for programming in machine tool
	ASSIST	S	Interactive screen for help programming Interactive screen for help operating
	Running CAD/CAM program in CNC	O	NCT 202 Windows 7 platform VECTOR, EdgeCAM
FUNCTIONS TO HELP TECHNOLOGICAL PROGRAMMING	Cycles	S	Drilling cycles Simple turning cycles Complex cycles (turning roughing, facing roughing, grooving, thread cutting, etc.)
	User specified cycles	O	Cycles written in MACRO programming language
	Define chamfer	S	,C
	Define fillet	S	,R
	Intersection point computing	S	Line – line Line – circle Circle - line Circle - circle
MANAGE PROGRAM	Subroutine technique	S	4 calling levels
	Conditional block skip	S	Max. 9 switches
	Macro programming	S	Effective solution for programming user cycles
EXECUTE PROGRAM	AUTOMATIC	S	Assign selected program file to run
	MDI	S	Execute new program when interrupt AUTOMATIC execution
	Handwheel	S	Program execution controlled by handwheel
SERVO DRIVE TECHNICS	EnDat 2.2 rotary encoder	S	Standard measuring system of Ai series NCT servomotors 33 million position/revolution Absolute measuring system through 4096 revolutions
	EnDat 2.2 linear scale	O	Absolute measurement 50 nanometer resolution
	SoE protocol	S	Sercos over EtherCAT
	CoE protocol	S	Can Open over EtherCAT
	Servo drive parameter setting	S	From CNC without using external unit Loading ready, tested parameters from directory Generate servo drive parameters of asynchronous servomotors using original parameters of motor (data table)
	Refreshing system program	S	From CNC without using external unit
	Servo drive setting	S	Autotuning Oscilloscope Circular test
	Tandem mode	O	Tandem mode of synchronous servo drives Tandem mode of asynchronous servo drives
	Power supply	O	Recuperation careful with mains
	Connection to other servo drives	O	By standard protocol (SoE, CoE) Analogue +/-10 V Pulse issue forward/backward Pulse issue (A, AN, B, BN) Pulse issue pulse/direction

Mr. George Dabis, director and Mr. Steve Matis chief engineer of Marathon Ltd. in HOUSTON (USA)

Special purpose lathe for machining seals with NCT control (USA)

Mr. László Fekete, chief software developer of NCT, giving technical support to Marathon Ltd. in Houston (USA)

GROUP	ITEM	S/O	DESCRIPTION
SERVOMOTORS	A series	O	Ferrite magnet
	Ai series	O	Neodymium magnet
	AiS asynchronous motors	O	Liquid cooling Bearing cooling Temperature measurement in several points 10000, 12000, 15000 speed
	AMS power spindles	O	Liquid cooling A2-5, A2-6, A2-8 spindle nose Temperature measurement in several points
	TORQUE motors	O	High intensity liquid cooling Tilting milling head Rotary table, indexing table
DIAGNOSTICS	Oscilloscope	S	Display characteristics of servo drive features
	Logic analyzer	S	Display PLC outputs/inputs in time diagram
	Circular test	S	Graphic display of synchronous running servo drive axes Check dynamics of servo drives Does not require external unit Display mechanical errors in machine equipped with linear scale
	Simbolic IO	S	Dispay PLC variables in optional order
	IO test	S	Display PLC outputs/inputs in chart
	Measuring system test	S	Display servo drive features in chart
ENVIRONMENTAL AWARENESS	Recuperation braking	S	In case of recuperation, if capacitor has filled than energy flows into mains from motor in generator running. Since machine tools have connected in common mains with another consumers, they receive the generated energy so electricity meter rotates slower.
	High capacity capacitor	S	Motor will be in generator running in braking, so energy flows to the servo drive, at first, it fills the capacitor
	Electronic gearbox	O	The electronic gearbox is cheaper than the mechanical construction and it has lower current drain than a high power motor without gearbox. The users are always short of power and improving mains is very expensive. Furthermore it requires smaller transistors, less capacitors, so the electronics is also cheaper.
	Drain heat out from electric cabinet produced by servo drives	S	Servo drives produce the most heat inside the electric cabinet. If this heat is drained out from electric cabinet so it does not stoke the electric cabinet than it does not require energy for cooling electronics.
	Switch off fans	O	Measure temperature of electric cabinet and cooling ribs and stop fans if possible No undercooling
	Decreased motor inertia	S	Less inertia = lower power requirement= lower loss
	Modern power switches	S	Minimal loss Minimal heat production
	Thin grease lubrication	O	Does not pollute coolant water Does not pollute environment

Mr. Krisztián Lisztes, manager of NCT machine production

Ms. Edit Szakálas, sales manager of NCT (international sales)

Mr. István Póka CEO

GROUP	ITEM	S/O	DESCRIPTION
INTERPRETED G-CODES	Data determination	S	G20/G21, G90
	Incremental programming	S	G91 Also with operator I
	Workspace limitation on/off	S	G22/G23
	Interpolations	S	G0, G1, G2, G3 G12.1/G13.1 G7.1[axis address]r/G7.1[axis address]0 G33, G34 G5.1 Q2 G28, G30, G31 Qn, G37, G36 G84.2, G84.3 G50.2/G51.2 G4
	Spindle oscillation inspection off/on	S	G25/G26
	Feeds and its control functions	S	G94, G95, G96, G97 G9, G61, G62, G63, G64
	Control functions of high speed machining	S	G5.1 (P0, P1, Q1, Q0, R1, R2, R3)
	Workpiece coordinate systems	S	G54, G55, G56, G58, G59, G54.1 P1-99
	Coordinate systems, transformations	S	G52, G53, G92 G17, G18, G19, G50, G50.1, G51, G51.1, G68, G69
	Tool corrections	S	G36, G37, G40, G41, G42, G43, G44, G49
	Drilling cycles	S	G73, G74, G76, G80, G81, G82, G83, G84, G84.2, G84.3, G85, G86, G87, G88, G89, G98, G99
	Turning cycles	S	G70, G71, G72, G73, G74, G75, G76, G77, G78, G79
	Macro calling	S	G65, G66, G66.1, G67
MACRO PROGRAMMING	Variables	S	Symbolic Local until 4 levels: #1-#33 Common: #100-#499, #500-#999
	Definition	S	#i=<formula>
	Arithmetical	S	+, -, *, /, MOD
	Logical	S	NOT, OR, XOR, AND
	Other	S	ABS, BCD, FIX, FUP
	Functions	S	SQRT, SIN, COS, TAN, ASIN, ACOS, ATAN, EXP, LN
	Conditional expressions	S	EQ, NE, GT, LT, GE, LE
	Junction	S	GOTO(block number) IF[<conditional expression>] GOTO(block number)
	Cycle management		WHILE[<conditional expression>] DOm...ENDm
	Data issue	S	POPEN, PCLOS, DPRNT, BPRNT, FOPON, FCLOS

Mr. László Horváth,
director of R&D department

Mr. Attila Apostol COO

Mr. József Deák, sales director

DISTRIBUTORS

SZENTPÉTERY PAVEL **Czech Republic** Praha 14000 Pod Vilami 3. T: +420 234 123 341 F: +420 234 123 341 szentpetery@oasanet.cz	**HUNOR DOO** **Croatia** Zagrab 10000 Lipanjska 4. T : +385 1 387 83 51 F : +385 1 387 30 07 hunor@zg.t-com.hr	**BEAR Werkzeugmaschinen GmbH** **Germany** Berlin, Kirchhofstraße 31. 13585 T: +49 306 170 2704 F: +49 306 170 2705 bearw@t-online.de
HUNOR-Naprawy OSN **Poland** 35-328 Rzeszów Popiełuszki ul. 22/63 T: +48 17 8541660 F: +48 17 8572216 mobil: +48 602 183692 hunor@hunor.pl www.hunor.pl	**CNC AUTOMATIKA** **Latvia** Ganibu Dambis 26, LV1005 Riga T : +371 29207082 info@cnc.lv www.cnc.lv	**ELEKTRONIS** **Poland** 65-077 Zielona Góra Al. Wojska Polsklego 74/4 T: +48 68 411 13 99 F: +48 68 422 70 14 info@elektronis.pl www.elektronis.pl
SLOVTOS spol.sr.o **Slovakia** Jasová 94134, Pri Novych Zámkoch T: +421 35 6477 110 F: +421 35 6477 103 slovtos@slovtos.sk	**KEREKES&Co Srl** **Romania** Str.Teilor Nr.12/16 Cluj Napoca, Floresti Jud Cluj T : +40 723 557 376 F:+40 264 279 732 nct@mailbox.hu kerekes@nct.hu	**Simultan Arad S.R.L.** **Romania** Bucaresti Str. Piscul Crasani NR.10 Sector 6. T : +40 722 668035 F : +40 21 434 3861 simultan@clicknet.ro
JSC "STANKOTECH" **Russia** Moscow 127055 Novoslobodskaya str. 58 T : +7 499 97848 55 F : +7 495 643 61 67 v_pirogov@stanko-nct.ru www.stanko-nct.ru	**MALEKS** **Ucraine** Odessa, 65031 Promyshlennaya str. 37/4. Odessa, 65005, box 98 T :+38 048 738-0735 T :+38 048 738-0736 F : +38 048 738-0735 F : +38 048 728-3098 maleks@eurocom.od.ua www.maleks.odessa.ua	**Marathon Machine Tools** **USA** 5515B-FM 1960 RD. East Humble, TX. 77346 T: +1- 281-812-2324 F:+ 1-281-812-4160 georged@marathon-excel.com www. marathon-excel.com

NCT IPARI ELEKTRONIKAI Ltd.
H-1148 Budapest, Fogarasi street 7. * Tel.: (+36-1) 46-76-300 * Fax: (+36-1) 46-76-309
nct@nct.hu * www.nct.hu